is full and authoritative. Hugh Cabot still regards spinal anæsthesia as having a place in surgery.

The chapter on Poison Gas in warfare is not solely of historic interest, because surgeons on ambulances and those connected with industrial plants and chemical laboratories will find much of practical importance.

The final chapter on a most successful method of dressing an artificial anus prepared by the editor himself is in the form of a case report and is the type of literature which is of the greatest practical use to surgeons and patients.

The index of the system consists of four " keys " ; first, each volume as it stands upon the shelf carries a conspicuous label of the general subject matter it contains; second, as we open the book the table of contents is quite complete; third, each volume has a separate index; and finally, the complete index of the entire eight volumes occupies 182 pages in the form of a desk volume and makes it perfectly easy for one to find any reference he may desire.　　　　STUART McGUIRE

SPECIAL ARTICLES

A NEW GRAPHIC ANALYTIC METHOD

1. THE graphic methods which deal with a treatment of two or three variables are commonly based on a relation of the variables to a system of rectangular cartesian coordinates. If the equation is known the laws may be expressed in the customary way by the methods of analytic geometry.

If, however, we are confronted with a system of two or more equations which are so related to each other that the growth of one will influence the growth of another (in a negative and positive sense) the following method will furnish a means of expressing such movements in a concise form and in a manner well adapted for the purpose of analysis.

Suppose we have three general equations:

$$x = f\ (a), \quad y = f\ (b), \quad z = f\ (c),$$

where the change of a will affect x as well as y and the change of b will affect y as well

as z and if further $f\ (a)$, $f\ (b)$ and $f\ (c)$ are quotients expressed:

$$\frac{a}{b}, \quad \frac{a}{c} \quad \text{and} \quad \frac{b}{c};$$

we have then:

$$x = \frac{a}{b}; \quad y = \frac{a}{c}; \quad z = \frac{b}{c}$$

and notice that each quotient or independent variable is related to the other independent variable by the possession of one of its algebraic members.

If a number of equations which have a relationship of this nature is brought into a system of positive coordinates as shown in Fig. 1, the four quadrants and the coordinates
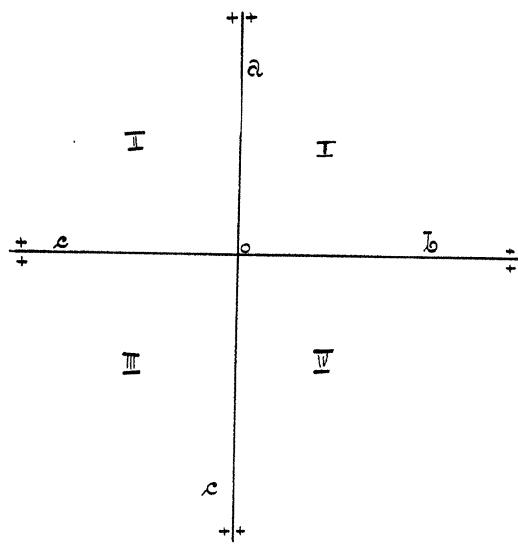
FIG. 1.

forming them may be named in the following manner:

I.　　Quadrant $a\ b$
II.　　Quadrant $a\ c$
III.　　Quadrant $c\ c$
IV.　　Quadrant $c\ b$

Therefore the ordinates of each quadrant will have two different coordinates or scale values with the exception of the third or neutral quadrant which axes have the same scale values c and are acting in a translative sense rotating the value c 90° to bring it in the third and last relationship with value b, in the fourth quadrant.
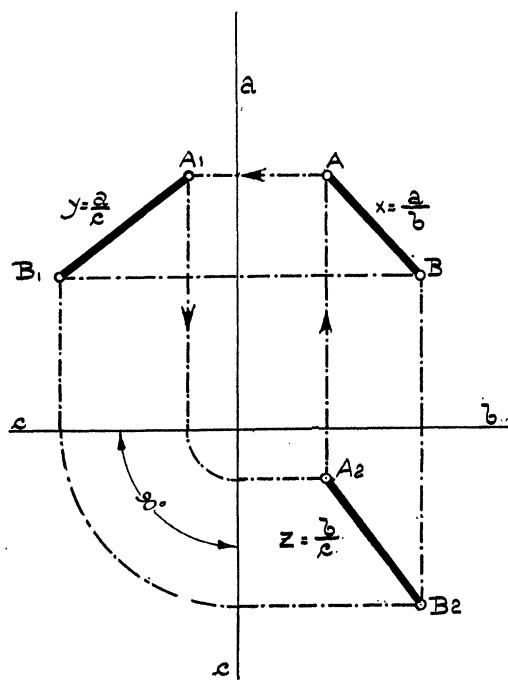
FIG. 2.

2. In such a system the growth (negative and positive) of a variable may be observed by connecting the plotted points of each quadrant which satisfy their respective equation with the points of each equation in the other quadrants, thereby obtaining for each set of three points a cycle line A, A_1, A_2 (as shown in Fig. No. 2). These points not only represent the actual values of x, y, z, but their location in reference to their respective axes represents the quotients expressed by the equations.

For example, Point A would represent by its location the quotient of certain values of a and b; or A_1 would represent by its location the quotient of certain values of a and c, and so on.

The application of the method may be illustrated by an actual example. Suppose we have the statistical data shown in the table given below. These data may be advantageously analyzed as outlined (Fig. 3).
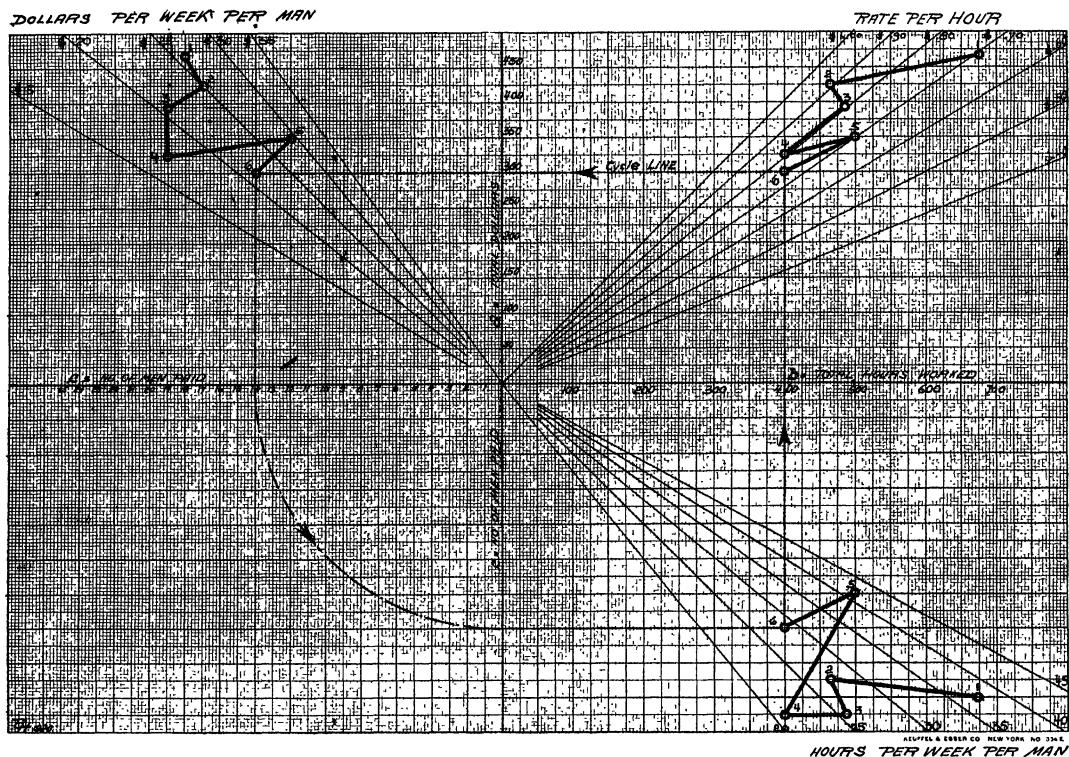

FIG. 3.

The *a* scale representing the number of dollars paid.

The *b* scale representing the number of hours worked.

The *c* scale representing the number of men working.

	$a =$ No. Dollars Paid	$b =$ No. Hours Worked	$c =$ No. Men Working
1st week	469	675	18
2d week	425	464	17
3d week	393	485	19
4th week	325	400	19
5th week	350	500	12
6th week	300	400	14

The quotient a/b will represent the hourly rate paid. The quotient a/c will represent the amount paid per man. The quotient b/c will represent the hours worked per man.

The radiant lines starting from the point of origin of the coordinate system are the equations of lines which represent a constant quotient. The location of the points given by the actual values of the table with reference to the radiant lines of each quadrant therefore determines graphically the actual value of each quotient.

For example, in the sixth week we observe the location of point 6 in the *first quadrant* between a rate of $.70 and $.80 per hour (actual value $300/400 = \$.75$).

In the *second* quadrant (as connected by the cycle line) the location of point 6 is between $20 and $25 a week (actual value $300/14 = \$21.42$) and nearer to the $20 line.

In the *fourth* quadrant (as connected by the cycle line) the location of point 6 is near the 30 hours per week line (actual value $400/14 = \$28.57$ hours).

If a longer period and a greater number of values are under observation, a moving average could be calculated and plotted in a similar way. There are a great number of data which have a similar relation to each other and may be presented and analyzed by this method.

Furthermore empirical data obtained by experiment may be subjected to this method and a possible positive or negative correlation of their respective movements determined.

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THE AMERICAN PHILOSOPHICAL SOCIETY [1]

The etiology, prophylaxis, and serum treatment of yellow fever: HIDEYO NOGUCHI. *Leptospira icteroides* was first isolated in 1918 from cases of yellow fever in Guayaquil; later the organism was obtained from yellow fever cases in Merida, Yucatan (1919) and in northern Peru (1920). The finding has also been confirmed in Mexico by Dr. Perez-Grovas, who transmitted yellow fever from cases of yellow fever in Vera Cruz in 1920 and obtained cultures. The most recent confirmation has come from Dr. Le Blanc of the Rockefeller Institute staff, working in Vera Cruz. The killed cultures of *Leptospira icteroides* were first used for protective inoculation against yellow fever in Guayaquil in 1918, where 427 vaccinations were carried out. The results were so encouraging (the morbidity rate among vaccinated and unvaccinated during the same period being 11 and 110 per thousand, respectively) that a vaccine several hundred times stronger has been made in large quantities and employed in Mexico and various Central and South American countries, the total number of non-immune persons reported vaccinated being about eight thousand. The development of protection is slow, requiring about 10 days for completion, and persons exposed to yellow fever just before vaccination or immediately afterwards are not protected by vaccination. Excluding such instances, however, there has been no case of yellow fever among the eight thousand vaccinated in the various localities, while among unvaccinated persons during the same period and in the same areas there have been about seven hundred cases of the disease. The use of vaccine furnishes a rapid method of elimination of non-immune persons from areas where yellow fever is epidemic. By the application of sanitary measures to eliminate the mosquito carrier and vaccination in the meantime to cut off the supply of non-immune material from the infected mosquito, a threatening epidemic of yellow fever in Guatemala and Salvador in 1920 is reported to have been checked within one month from the appearance of the first cases, that is, before a second set of cases had developed. The value of vaccination as an emergency measure does not, however, minimize the importance of the anti-mosquito operations, the elimination of both factors—the non-immune human being and the infected mosquito—being essential

[1] Abstracts of papers presented at the annual meeting, Philadelphia, April, 1921.